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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
HO, ALLEN C

ART UNIT	PAPER NUMBER
2882	

DATE MAILED: 08/01/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/739,622	CASTENMILLER ET AL.	
	Examiner	Art Unit	
	Allen C. Ho	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 May 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16 and 18-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,12-16 and 18-20* is/are rejected.

7)☒ Claim(s) *11* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 December 2000* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on *06 May 2003* is: a)☐ approved b)☒ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, "the three position detection devices are arranged orthogonally with respect to each other" as claimed in claim 19 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

2. The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on 16 May 2003 have been disapproved. A proper drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The correction to the drawings will not be held in abeyance.

The proposed Fig. 2 includes IF, which is considered new matter.

Specification

3. The amendment filed 16 May 2003 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: interferometers IF.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Objections

4. Claim 12 is objected to because of the following informalities:

Claim 12 recites the limitations "providing a substrate provided with a radiation sensitive layer to a second object table" and "determining a reference position of one of the object tables relative to a reference frame". However, there is only one object table.

Appropriate correction is required.

5. Claim 13 is objected to because of the following informalities:

Claim 13 recites the limitation "said incremental position sensing system ". There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-3, 7, 10, and 12-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishi (U. S. Patent No. 5,243,195) in view of Kanaya *et al.* (U. S. Patent No. 5,995,22).

With regard to claims 1-3, 7, 10, 15, Nishi disclosed a lithographic projection apparatus comprising: a projection beam illumination system which supplies a projection beam of radiation (inherent); a first object table (RST) for holding a projection beam patterning device (PA) which

patterns the projection beam according to a desired pattern; a second object table (WST) for holding a substrate (W); a projection system (PL) which images the patterned beam onto a target portion of the substrate; a reference frame (X, Y, Z); and three position detection devices (IFX, IFY1, IFY2) comprising: three laser sources (inside the enclosure) mounted on the reference frame (stationary with respect to X, Y, Z), three radiation detectors (inside the enclosure) mounted in a fixed position on the reference frame (stationary with respect to X, Y, Z), and two mirroring devices (IMX, IMY) mounted on one of the object tables that is movable relative to the reference frame so as to reflect monochromatic collimated laser beams emitted by the laser sources toward the radiation detectors.

However, Nishi failed to teach that the radiation detector is a two-dimensional PSD, or a CCD, or a four-quadrant photo-detector.

Kanaya *et al.* disclosed a position detection device that uses a two-dimensional CCD detector for measuring interference fringes.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ a two-dimensional CCD for light detection, since a person would be motivated to use a two-dimensional detector to measure the two-dimensional interference fringe patterns produced by the movement of the second object table.

With respect to claims 12, 14 and 16, Nishi disclosed a method of manufacturing a device comprising: providing a substrate (W) provided with a radiation-sensitive layer (column 1, lines 11-16) to a second object table (WST); providing a projection beam of radiation using an illumination system (inherent); patterning the projection beam to form a pattern in its cross section (PA); projecting (PL) the patterned beam onto the target portions of the substrate; and

determining a reference position of the second object table relative to a reference frame (X, Y, Z) by: emitting radiation from a radiation source (IFX, IFY1, IFY2) mounted on the reference frame (stationary relative to X, Y, Z) toward a mirroring device (IMX, IMY) mounted on the second object table, reflecting the radiation, and detecting the reflected radiation in a radiation detector (IFX, IFY1, IFY2) mounted in a fixed position on the reference frame (stationary relative to X, Y, Z).

However, Nishi failed to teach that the radiation detector is a two-dimensional PSD, or a CCD, or a four-quadrant photo-detector.

Kanaya *et al.* disclosed a position detection device that uses a two-dimensional CCD detector for measuring interference fringes.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ a two-dimensional CCD for light detection, since a person would be motivated to use a two-dimensional detector to measure the two-dimensional interference fringe patterns produced by the movement of the second object table.

With regard to claim 13, Nishi in combination with Kanaya *et al.* disclosed a method according to claim 12, further comprising: determining an absolute position (with respect to the X, Y, Z reference frame) of the second object table by measuring movements thereof relative to the reference position using the incremental position sensing system (IFX, IFY1, IFY2).

8. Claims 4, 8, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishi (U. S. Patent No. 5,243,195) and Kanaya *et al.* (U. S. Patent No. 5,995,22) as applied to claim 1 above, and further in view of Makinouchi (U. S. Patent No. 5,907,392).

With regard to claims 4, 8, and 9, Nishi in combination with Kanaya *et al.* disclosed the apparatus according to claim 1, comprising mirroring devices mounted on one of the object tables.

However, Nishi and Kanaya *et al.* failed to teach or fairly suggest that the mirroring device is a retro-reflector that comprises either a trapezoid form having three mutually perpendicular surfaces meeting at a corner, or a convergent lens and a reflective surface, the reflective surface being spaced a distance from the lens equal to the focal length of the lens.

Makinouchi disclosed an exposure apparatus that uses a retro-reflector (**13L**, **13R**) as a mirroring device mounted on a moving object table.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ a retro-reflector that comprises a trapezoid form having three mutually perpendicular surfaces meeting at a corner as a mirror device, since a person would be motivated to use any thing that is functionally equivalent to a mirroring device on one of the object tables. Furthermore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to choose from among the known equivalents based solely on design choice absent any showing of criticality. The lack of criticality is demonstrated by applicant's claiming of a plurality of equivalent devices.

9. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishi (U. S. Patent No. 5,243,195) and Kanaya *et al.* (U. S. Patent No. 5,995,22) as applied to claim 1 above, and further in view of Tei *et al.* (U. S. Patent No. 6,144,025).

With regard to claims 5 and 6, Nishi in combination with Kanaya *et al.* disclosed an apparatus according to claim 1, comprising a laser source.

However, Nishi and Kanaya *et al.* failed to teach or fairly suggest that the laser source comprises a laser diode mountable away from the reference frame, beam-directing optics mountable on the reference frame, and an optical fiber to couple the laser diode to the beam directing optics.

Tei *et al.* disclosed an interferometer comprising an optical fiber (**2**) that couples a laser diode (**1**) to the beam directing optics (**3**, **4**, **5**).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to introduce a laser beam using an optical fiber, since an optical fiber is much more flexible and convenient than optics for introducing a laser beam in a confined area.

10. Claims 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada *et al.* (U. S. Patent No. 6,163,369) in view of Kanaya *et al.* (U. S. Patent No. 5,995,22).

With regard to claims 18-20, Yamada *et al.* disclosed a lithographic projection apparatus comprising: a projection beam illumination system which supplies a projection beam of radiation (inherent); a first object table for holding a projection beam patterning device (reticle) which patterns the projection beam according to a desired pattern (column 6, lines 12-15); a second object table (**3**) for holding a substrate (**2**); a projection system (**1**) which images the patterned beam onto a target portion of the substrate; a reference frame (X, Y, Z); and a position detecting system including three position detection devices (X-interferometer, Y-interferometer, Z-wafer surface position and inclination detection), each position detection device comprising: a radiation source mounted on the reference frame (lasers **17** in the interferometers and illuminating light source **4**), a radiation detector (inherent for interferometers and a two-dimensional radiation detector **11**) mounted in a fixed position on the reference frame, a mirroring device (reference

mirrors **15** for the interferometers and wafer surface for position and inclination detection) mounted on one of the object tables that is movable relative to the reference frame so as to reflect radiation emitted by the radiation source toward the radiation detector, wherein the position detection devices are arranged orthogonal to each other.

However, Yamada *et al.* failed to teach that the radiation detector for the interferometer is a two-dimensional PSD, or a CCD, or a four-quadrant photo-detector.

Kanaya *et al.* disclosed a position detection device that uses a two-dimensional CCD detector for measuring interference fringes.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ a two-dimensional CCD for light detection, since a person would be motivated to use a two-dimensional detector to measure the two-dimensional interference fringe patterns produced by the movement of the second object table.

Allowable Subject Matter

11. Claim 11 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. The following is a statement of reasons for the indication of allowable subject matter:

With regard to claim 11, although the prior art discloses an apparatus according to claim 1, it fails to teach or fairly suggest that the apparatus further comprises a combiner which combines output signals from the incremental position sensing device.

Response to Arguments

13. Rejection based on Nishi (U. S. Patent No. 6,331,885 B1) has been withdrawn in response to applicant's argument.

14. Rejection of claims 1-10 and 12-16 based on Van Den Brink (U. S. Patent No. 5,801,832) has been withdrawn since it does not add anything substantive in addition to the teachings of Nishi (U. S. Patent No. 5,243,195).

15. The examiner stands by the decision not to give any patentable weight to a "position detection device". As noted in the MPEP § 2111, claims are given their broadest reasonable interpretation consisting with the specification. It is proper to use the specification to interpret what the applicant meant by a word or phrase recited in the claim. However, it is not proper to read limitation in the claim. See *In re* Paulsen, 30 F.3d 1475, 1480, 31 USPQ2d 1671, 1674 (Fed. Cir. 1994).

16. In response to applicant's argument that Nishi failed to teach or suggest a position detection device, the examiner would like to point out that the "position detection devices" disclosed by Nishi comprise radiation sources, radiation detectors, and mirroring devices as claimed in claim 1. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

17. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Conclusion

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

(1) Kida *et al.* (U. S. Patent No. 6,141,108) disclosed a position control method in exposure apparatus.

(2) Loopstra *et al.* (U. S. Patent No. 6,020,964) disclosed a lithograph apparatus including an interferometer system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen C. Ho whose telephone number is (703) 308-6189. The examiner can normally be reached on Monday - Friday from 8:00 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward J. Glick can be reached at (703) 308-4858. The fax phone numbers for the

organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0530.

ACH
July 28, 2003

Allen C. Ho

Allen C. Ho
Patent Examiner
Art Unit 2882